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GOVERNMENT OF ALBERTA

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Public Hearings on

"The Environmental Impact of
Surface Mining in Alberta"

Edmonton

December 17, 1971

Alberta Environmental Protection



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INTRODUCTION

Luscar Ltd. fully endorses these public hearings on the subject of the environmental impact of surface mining in Alberta, and welcomes the opportunity to present comments. We regard these hearings as a constructive step towards evolving a sensible approach to what has become a frustrating matter for the public, government and industry alike.

Luscar has a vital interest in this whole subject, and can comment on the basis of 60 years in the Western coal mining industry:

(a) The company is active in each of the three distinct mining regions in the province:

(i) Mountain Region:

- Luscar operated the former Mountain Park mine from 1912 to 1950;
- Luscar operated the former Luscar mine from 1921 to 1956;
- the surface mine opened at Luscar, Alberta in 1969 by Cardinal River Coals Ltd. is a joint (50/50) venture of Luscar Ltd. and Consolidation Coal Company of Canada.

(ii) Foothills Region:

Luscar has plans to open a bituminous property as soon as market conditions warrant.

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(iii) Plains Region:

- Forestburg Collieries Ltd., a subsidiary of Luscar Ltd., has operated a surface mine near Forestburg since 1949, and this year acquired the Kleenbirn Collieries mine near Kitsim, Alberta;
- another subsidiary, Manitoba and Saskatchewan Coal Co. Ltd., produced over 900,000 tons of lignite at a mine in southern Saskatchewan last year, and will shortly open another mine to produce up to 1,850,000 tons of lignite per year;
- the company also owns and operates a plant at the Saskatchewan coalfield which converts lignite to coal char and fuel briquettes.

(b) Luscar Ltd. has extensive coal reserves throughout Alberta. Many leases have been held for years (some for more than 50 years) at considerable cost to the company. The company retained its coal properties even during the most depressed years of the coal industry; had it and a few others not done so, the recent resurgence of the industry would have been more difficult to achieve.

(b) Luscar is deeply involved in the formidable problems of marketing the coals of Alberta, both in Canada and internationally. It is worth noting how many companies and individuals are now involved in the search for coal deposits, but

how comparatively few are actively engaged in bringing coal properties into production; fewer still have experienced the whole difficult process of opening a mine and maintaining production.

In view of the company's background and present scope of operations, we believe Luscar has the credentials to speak knowledgeably about the practical side of the issues under consideration at this hearing.

Unfortunately, any discussion of environmental issues tends to become polarized all too quickly. Those who express any reservations about going to the extreme with reclamation efforts tend to be branded as callous or indifferent toward the environment, and opposed to reclamation and environmental control.

We want to make our position abundantly clear from the outset of this presentation: our company fully recognizes the need for environmental control and regulation, and believes in reclamation - in fact we practice it.

At the same time, our role in the economic life of the province is to develop coal resources. Left in the ground, such resources have no more than latent or potential value. Our job is to convert these resources into real value, to the benefit of all in the province.

This is by no means as easy a task as it may popularly be imagined to be. We in Alberta have more than enough economic hurdles to overcome as it is, without going out of our way to create any more than necessary. Our concern is that over-zealousness in the area of

environmental regulation and control could easily have more adverse and even drastic consequences than is realized.

We believe that our main contribution to these hearings should therefore be to point out the potential pitfalls and practical consequences of what might be undertaken, and to clear up certain misconceptions regarding the industry.

I SUMMARY OF MAJOR COMMENTS AND RECOMMENDATIONS

1. Luscar fully supports the proposition that the mining industry in the province should in future be required to restore to an appropriate condition land disturbed by surface mining operations. We therefore welcome action by the government at this time to formulate legislation and regulations, and to establish the organization and mechanism for effective administration. We fully agree it is essential to maintain a balance between environmental and economic considerations.
2. We agree with the concept of a planned approach rather than remedial efforts after the fact. The starting point should be for the owner of the land to select an end use or uses compatible with the terrain and environmental factors. This should be followed by:
 - (a) the planning of mining and reclamation operations to achieve the appropriate surface contour, which would not necessarily be the original contour;
 - (b) the planning of measures to revegetate the disturbed land surface.

3. It is vitally important that in devising reclamation requirements, full recognition be given to economic realities. We are afraid, however, that there are a number of misconceptions regarding the economics of the industry which need to be clarified:
 - (a) In the benefit/cost equation, we doubt it is fully understood how widespread are the economic benefits derived from the industry, or the industry's potential for contributing to employment.
 - (b) The coal industry in Alberta faces a far more competitive and difficult marketing situation than is popularly supposed.
 - (c) Economically recoverable deposits of coking coal in the province are much scarcer than may be realized.
4. We would like to encourage the government to introduce appropriate regulations in writing to guide reclamation activities, subject to the following:
 - (a) an unusual degree of flexibility will have to be incorporated in such regulations because of the wide variety of conditions encountered in the province;

- (b) development of regulations about revegetation in the mountains will have to await the results of further research efforts and experimental plantings;
- (c) it must be recognized that reclamation regulations have to be tailored to the conditions of each distinct area; it would be a mistake to attempt comprehensive regulations to be applied universally throughout the province, or to impose regulations designed for conditions different from those of Alberta (e. g. highly acid conditions of the US Appalachian region).

5. We welcome the present opportunity to comment in advance on the proposed legislation. It is equally important that the industry be given an opportunity to comment on the corresponding regulations which will stem from the legislation.

We also urge the government to allow the industry the right to appeal unreasonable or unworkable regulations.

6. There are certain features of the proposed legislation which we recommend be reconsidered:

- (a) We disagree that there is any necessity for expropriation of surface and/or mining rights by the government in order to deny their use by industry.

- (b) The proposal whereby the government would acquire mineral rights through exchange would seldom be practical.
- (c) We would have to object in the strongest possible terms if the provincial government intends to expropriate or otherwise acquire leases or other mineral interests granted by the Federal government prior to 1930.
- (d) It would create much uncertainty and jeopardize development of the province's coal reserves if the Minister were to be authorized to prohibit surface mining on "cultural, scenic or aesthetic grounds"; we are opposed to any such provision in the forthcoming legislation.
- (e) We urge the government to give the industry an opportunity to participate in the development of regulations pertaining to the proposed legislation.
- (f) The industry should have the right of appeal in connection with regulations.
- (g) Comprehensive environmental planning before issuance of a coal lease and/or before issuance of an exploration permit would be impractical and unwarranted.

- (h) With regard to the idea of reclaiming "simultaneously with operations", it would be impractical to expect reclamation to follow directly on the heels of the loading of coal from the seam; a reasonable time interval is needed between mining and reclamation.
- (i) Retroactive responsibility for reclamation of previously disturbed land should extend no further back than 1963 when the Surface Reclamation Act was proclaimed.
- (j) The notion of mineral rights as a "privilege" which could be withdrawn by the government would constitute a fundamental change, the implications of which should be most carefully considered. If this concept is to be adopted, we believe a distinction needs to be made between existing leases and leases which may be issued in future.

7. We recommend that more flexibility be permitted in future than has been allowed to date in the matter of diverting minor water courses in the vicinity of surface mines.

8. Test pits opened in the course of exploration work should be allowed to remain open longer than is permitted at present.

While the foregoing summarizes our major comments and recommendations, the submission which follows contains a number of additional comments and suggestions, as well as explanatory material which may be of interest to the Authority.

II CONTRIBUTION OF THE COAL MINING INDUSTRY TO ALBERTA'S ECONOMY

What we are dealing with is essentially a benefit/cost analysis. The benefits tend to be mainly economic, the cost mainly in the area of environmental disturbance. This type of benefit/cost relationship is equally applicable to many other familiar situations; for example:

- logging
- farming
- oil and gas exploration and development
- highway construction
- hydro-electric power projects
- thermal power generation
- electrical transmission lines.

The prospectus which was prepared by the Authority to set the stage for these hearings stressed the need for "balance". That is indeed the key. The prospectus also stated that "no one will deny the economic benefits". However, we are not persuaded that it is in fact adequately recognized how widespread and substantial the benefits really are.

A fair and objective recognition of the scope and scale of economic benefits must take into account all the following:

- direct employment at the mines
- indirect employment with suppliers of materials
and services, railways, terminals, etc.
- railway operations
- bulk terminal operations
- equipment manufacturing
- construction of mine facilities, highways and
railways

- power generation and transmission
- taxes paid to municipal and provincial authorities
- lease rentals and royalties paid to the provincial government and individuals
- sponsorship of research and development projects.

While this point can and should be expanded, we will not endeavor to do so at this time. However, the contribution which our industry is making to employment, and the significantly larger contribution it can make (and will make, given an opportunity to do so) to the employment situation warrants emphasis. This is particularly important at a time when the Economic Council of Canada estimates that the nation is faced with the massive problem of finding 1,400,000 new jobs by 1975. Our industry's contribution to the employment picture has been unjustifiably belittled. Perhaps it is sufficient to point out that the Cardinal River operation, while now in only the 21st month of a 15 year contract, has already provided on the order of more than 900 man-years of direct employment within Alberta and very substantially more if employment in service and supply industries is taken into account.

Elsewhere in Canada, the concern regarding employment is such that the federal government subsidizes coal production at Cape Breton, Nova Scotia, to the extent of \$25,000,000 per year (\$13.75 per ton produced) in order to maintain employment for 4,000 workmen; this is equivalent to \$6,250 per year for each man employed. This is by no means the only such subsidy paid in Eastern Canada. In contrast, our company and others in the industry in Alberta are creating new employment - and are doing so

unassisted. All we ask is not to be unduly hindered in the process.

It seems to us that the value of jobs generated by industry without assistance must be taken into account in the benefit/cost analysis. To the extent that the number of jobs so created is less than the number required to achieve a reasonable level of employment nationally, governments in Canada evidently feel increasingly obliged to spend very large sums to stimulate employment. In other words there is a decided cost associated with inhibiting the development of an industry such as ours which can contribute importantly to employment.

III HIGHLY COMPETITIVE MARKET SITUATION

Publicity in connection with developments in the industry over the past two years or so have given rise to a popular misconception to the effect that a world hungry for coking coal and energy is eagerly lining up to place orders for coal from Alberta. Unfortunately, in reality the situation is very different. Alberta producers face an extremely competitive situation in the several possible markets for their coal, and encounter stiff opposition in the struggle to obtain a foothold in additional markets.

Potential markets for coking coal from Alberta are to be found in Japan, Central Canada and Europe. So far, the only actual lasting achievement of the industry has been to break into the Japanese market for coking coal. Costs and competition from elsewhere have prevented Alberta producers from winning contracts in other markets. Until as recently as a few months ago, Japan appeared to offer ever-increasing scope as a consumer of Alberta coking coal. Now that market is so depressed that the Japanese are not even interested in discussing additional tonnage. In fact, the Alberta industry is doing well not to have been obliged to slow down on deliveries, as US suppliers have had to do.

Only a fraction of Alberta's coal reserves are of coking coal quality. Most of our coal is steam (thermal) coal; Western Canada, Central Canada, Japan and Europe might be regarded as the main potential markets for such coal. Costs of exploration, production and transportation continue to limit to Western Canada the market for our steam coal. Even Central

Canada remains out of reach: a recent and thorough market study concluded that the price which Western steam coal could bring in Central Canada would no more than cover transportation costs, leaving nothing for mining costs.

The formidable competitive factors which stand in the way of broadening our markets include the following:

1. Australia has become a major competitor as a source of coking and steam coal. In the first half of 1971, Australia supplied 8,200,000 tons of coking coal to Japan, compared to only 3,500,000 from Western Canada. Their geological conditions are more favorable than ours and this permits lower cost mining than in the mountain regions of Alberta. The Australian mines are much closer to tidewater than the Alberta coal, and do not have to contend with the severe winter conditions found in Alberta. In the expanses of Australia, operators seem to be obliged to pay little or no regard to environmental considerations. Ocean shipping distances from Australia are no greater than from Western Canada to Japan or to Europe (for larger vessels which cannot transit the Panama Canal).

2. With their shipments to Japan being curtailed, U.S. suppliers of coking coal are looking harder at alternative markets and this is creating an even more competitive situation for Alberta producers.
3. B.C. has extensive coal reserves and these are closer to tidewater than the Alberta deposits.
4. The cost of moving coal from Alberta to Central Canada is four or five times greater than the cost of moving competitive coal from Eastern U.S. sources into the same area.
5. Large surface mines are being opened in the Western U.S. from New Mexico to Montana. These have cost and tax advantages over Alberta mines, and they virtually preclude the sale of coal from Alberta to the U.S. Northwest.
6. The market for coal is the energy market, and coal is thus in tough competition with natural gas, oil, hydro and nuclear power. As an example, it might be noted that the Clover Bar generating station of Edmonton Power, which was opened only last year, is gas-fired despite its proximity to the coalfields in the Edmonton vicinity.

The point which we wish to make is that, notwithstanding high hopes and optimistic projections, the coal industry in Alberta faces intense competition and will have an uphill struggle to achieve its aspirations. The key to marketing is of course production and transportation costs and therefore the prices at which the coal can be offered. It must be realized that any measures which increase the cost of mining coal in Alberta will have the effect of diminishing the market potential of that coal and therefore restrict the growth potential of the industry. It would be a mistake to proceed in the belief that the industry can expand and contribute in increasing measure to the economy and employment regardless of the regulations and standards imposed upon it.

The fact that there are not more producing mines in Alberta today is not for want of trying by the industry, nor is it for lack of coal deposits or potential markets - the truth of the matter is that the coal cannot be sold at prices commensurate with the costs of mining and delivering it.

IV COMMENTS ON PROPOSED LEGISLATION

The "draft position statement" issued by the Department of the Environment on November 19, 1971 has provided only a sketchy indication of the legislation under consideration. It is difficult to comment when the full meaning and implication of many features is unclear. Nevertheless, we wish to offer the following comments on the basis of what can be read into the Department's release.

1. Para. 4.01/4.02 - Expropriation of Surface and/or Mining Rights by the Government in order to deny their use (by industry).

We disagree there is any necessity for recourse to as extreme a measure as expropriation. Let there be environmental standards which must be met. If the economics of a particular situation make it feasible to meet these standards, then industry should be allowed to proceed; if the standards cannot be met, industry will not proceed. There is no need beyond this for the government to prohibit industrial development through expropriation.

It seems to us that, in the Alberta context, such expropriation powers would be incongruous and wholly inconsistent with a policy of economic development and also with a reputation as a province where conditions are conducive to economic development.

If (regretably) the expropriation provision does remain in the legislation, surely the specific circumstances under which such powers may be used will be clearly defined for the protection of all concerned.

2. Para. 4.01/4.02 - Acquisition by the Government of Mineral Rights through Exchange.

In the mountain region, the idea that the government could acquire mineral rights by offering to exchange mineral rights at some other location could rarely be expected to be practical because of:

- the scarcity of economically recoverable deposits of coking coal;
- the difficulty of equating deposits because of the many variables involved.

From time to time, reserve estimates appear which indicate very substantial reserves of coking coal along the western fringe of Alberta. Coking coal can indeed be found at varying depths along the formation from the Crow's Nest in the South to the Peace River in the North, and reserves have been estimated to a depth of some 3,000 feet. However, there are disappointingly few deposits of economically recoverable coking coal in Alberta, when one takes into consideration:

- the small proportion recoverable by surface mining methods, a more efficient and thus lower-cost type of mining than underground methods
- the extent to which the structure of these coal deposits has been distorted geologically, rendering it impractical to mine much of the coal
- the difficulty of road and rail access
- the extent to which coal quality varies along the formation with respect to ash, volatile matter, moisture, swelling index, fluidity etc.

3. Para. 4.04 - Acquisition by Provincial Government of Mineral Interests Granted by the Federal Government.

It is not at all clear what this means. Our company holds many coal leases issued originally by the federal government prior to 1930 when such matters were within the jurisdiction of that government. In the course of the routine renewal of such leases subsequent to 1930, the leases were reissued by the provincial government. We also have freehold property (surface and mineral rights) acquired prior to 1930. Our company still retains many of the original leases issued to the early prospectors of the Luscar and Mountain Park areas, and lease rentals and royalties have been paid on these to the prospectors and their beneficiaries and to the Crown for more than

We would object in the strongest possible terms to any suggestion that the provincial government now intends to take such leases and property away from us.

4. Para. 4.10 - Power of the Minister.

The proposed legislation would authorize the Minister to prohibit surface mining on cultural, scenic or aesthetic grounds.

By all means let there be environmental safe-guards and controls, in the form of objective standards which can be defined and properly administered. But "cultural, scenic or aesthetic grounds" are entirely too subjective and discretionary to be fairly and equitably administered. Such a provision in the legislation would result in much uncertainty and would jeopardize development of Alberta's resources (not coal alone). We urge that it not be incorporated in the forthcoming legislation.

5. Para. 4.08/4.09 - Regulations and Guidelines.

We trust that not only will the legislation provide for regulations, but practical regulations will in fact be issued. It creates great difficulties for both industry and those responsible for administration of the legislation when constructive regulations are lacking, as they are at present.

We regard the development of such regulations to be as important and challenging a task as the drafting of the relevant legislation. The fact that the present hearings are taking place indicates that the government subscribes to the principle of informed participation in such matters. We urge the government to give industry a similar opportunity to contribute to the process of developing regulations. No one wants impractical regulations; they are frustrating for the enforcement authorities and disruptive - indeed potentially disastrous - for industry. The surest safeguard will be to provide for industry/government consultation as regulations are being formulated.

6. Para. 4.03 - Arbitration and Appeal.

The proposed legislation provides for arbitration and appeal with regard to:

- acquisition by the government of mineral and surface rights
- implementation of plans and approvals.

It is equally important that there be provision for the right of appeal in connection with regulations.

7. Para. 4.06 - Application and Approval.

We agree with the planned approach to restoration of the surface of land disturbed by surface mining operations. Our concept of this approach is that it involves three primary phases:

1. Before mining operations begin, the owner of the land surface (i.e. the government in the case of public lands, the land owner in the case of patented or private land) selects an end use or uses compatible with the terrain and environmental conditions.
2. The planning of mining and reclamation operations to achieve the appropriate surface contour, which would not necessarily be the original contour.
3. The planning of measures to revegetate the disturbed land surface.

Such plans should be developed by the operator of a proposed mine and submitted to one agency designated by government.

Para. 4.063 seems to provide for the foregoing planning process, prior to the commencement of mining operations.

In addition, Paras. 4.061 and 4.062 appear to provide for similarly comprehensive environmental planning at two earlier stages:

- (i) before issuance of a coal lease
- (ii) before issuance of an exploration permit.

We submit that it would be premature and impractical to expect comprehensive planning at such an early stage. Exploration activity is already very tightly regulated and subject to prior approval by the government (see part VII of this submission) so there is little or no risk of lasting environmental damage. The operator is in no position to present a case for development of a property until it is known to what extent, if at all, there is a deposit of economically recoverable coal on the property. To be practical, the kind of planning envisaged in Para. 4.06 will of necessity have to await the outcome of exploration activities.

8. Para. 4.07 - Reclamation "Simultaneously with Operations".

We agree that reclamation activities should be conducted as an integral part of surface mining operations. The use of the word "simultaneous" suggests, however, reclamation activities following directly on the heels of the loading of coal from the seam. If this is indeed the intention, it should be pointed out that this would be wholly impractical. Neither seasonal weather conditions

nor the sequence of mining operations would permit reclamation to proceed immediately after the removal of coal.

In the plains region, a practical approach would be to allow the operator to maintain an unreclaimed strip of three spoil ridges between the open pit and the edge of the reclaimed area. Even this could be too tight in the case of a multiple-seam mine.

9. Para 4.11 - Retroactive Application.

In our view the retroactive feature referred to should extend back no further than 1963, when the present Surface Reclamation Act was proclaimed. To go further back would be to discriminate against a few existing operators who have survived from an earlier era of coal mining in the province.

A number of mine operators in the province has declined drastically:

	<u>Number of Mines</u>
1930	301
1940	278
1950	207
1960	69
1970	26

Each of the operators, in their time, operated in accordance with the laws and accepted practices of their period. Practically all (our company being one of the few exceptions) have by now passed out of existence.

It seems to us it would be grossly inequitable if the few surviving operators should be called upon to apply retroactively the reclamation standards of today. To do so would penalize these few operators and place them at a competitive disadvantage.

10. Para. 4.12 - Security Deposit.

It might be noted that Cardinal River is already required to submit a security deposit of \$500 per acre to guarantee reclamation, so this feature (like many others) should not be regarded as something new.

11. Paras. 4.13/4.14 - Satisfactory Reclamation.

These paragraphs refer to the criterion of "satisfactory reclamation". This underscores the necessity for regulations to define what will in fact constitute "satisfactory reclamation".

12. Para. 3.3 - Consolidation.

The Environment Conservation Authority has stressed the need for a balanced approach in this whole matter, and we know from experience how essential this is in respect to administration and enforcement. It is very reassuring, therefore, to find in this paragraph an indication that administration will be inter-departmental and that measures will be taken to avoid unilateral action by any one department. We consider this to be very important.

We would hope that the consolidation process referred to will include rationalizing existing legislation pertaining to reclamation. The existing legislation is fragmented to the point of confusion. For example, the following all have a bearing to some extent on surface mining and reclamation activities:

- Coal Mines Regulation Act
- Surface Reclamation Act
- Mineral Surface Lease Regulations of the Public
Lands Act
- Department of the Environment Act
- Clean Water Act
- Forests Act
- Canada Water Act
- Fisheries Act.

A new consolidating Act may be warranted; yet another Act in addition to the existing ones would not be.

13. Para. 2.4 - Compensation required for Environmental Damages.

The statement that the "resource user" (an expression which apparently means the mine operator) would be required to bear the financial cost is an oversimplification which should be examined.

To the extent that the proposed legislation requires more extensive and more costly reclamation than in the past, the additional cost entailed will have one of the following effects:

- (a) As in the case of any cost increase, the operator will endeavor to pass the cost on to the ultimate consumer of the coal in the form of a price increase, to whatever extent it may be possible for the operator to do so and still remain competitive.
- (b) In many cases, mine operators supply coal under longterm contracts. Where these contracts do not permit such cost increases to be passed on in the form of price escalation, the operator will be forced to absorb the additional cost.

(c) The increased cost will mean that the market for Alberta coal is diminished; that is, there will tend to be a loss of existing or prospective markets to producers outside of Alberta or to other fuels.

14. Para. 2.5 - Privileges as Opposed to Rights.

Quite apart from the merits of what is implied by this section, it must be recognized that it would involve a fundamental change in the concepts which have applied until now. We therefore believe that a distinction should be made between existing leases and leases which may be granted in future.

With regard to future leases, a prospective lessee will presumably be on notice from the outset regarding the conditions which will apply to the lease and can assess the situation before entering into the lease.

The lessee of an existing lease, on the other hand, is already locked into a lease in which he probably has accumulated a substantial investment in the form of:

- exploration and drilling costs
- reservation fees paid to the Provincial Government
- in some cases, the cost of acquiring the lease from a previous lessee

- annual lease rental charges paid to the provincial government
- the cost of efforts to develop a market for the coal on the property.

Regarding the nature of mineral interests, it should be noted that according to existing coal leases "Her Majesty hereby grants unto the lessee the exclusive right to win and work all mines, seams and beds of coal in, on, or under the lands more particularly described as follows". Does the provincial government now intend to repudiate such rights, after existing lessees have invested heavily to acquire and maintain them?

To summarize our views of the proposed legislation, it seems to us that, apart from certain incongruous features negative in character, it would add little not found already in existing statutes. What is needed now is not more legislation but rather practical regulations and guidelines and organization for effective administration.

V SURFACE MINING IN THE PLAINS REGION

Forestburg Collieries Limited, a subsidiary of Luscar Ltd., has operated a surface mine near Forestburg since 1949. We would like to refer to this mine as an example of surface mining in the plains region, and also to comment on our experience with reclamation at that location.

Illustration A is a cross section through the pit, to show how the mining operation is carried out.

Prior to 1949, coal was mined from the property by underground means. Since 1949, almost 8,000,000 tons have been removed by surface mining; the total area disturbed in that time is 1,070 acres or 1.67 square miles. The mine currently produces between 600,000 and 700,000 tons per year and this involves removing overburden from 70/80 acres per year.

The following summarizes the present state of the area which has been disturbed by the mining operations over the past 22 years:

- (a) 618 acres (the area mined between 1949 and 1965) have been seeded, after working down the tops of the spoil piles with a dozer. This was the reclamation practice approved by the authorities until 1967, when the Surface Reclamation Council instructed the mine that the valleys between two ridges of the spoil piles were thereafter to be no deeper than five feet.
- (b) about 200 acres have been contoured in accordance with the 1967 instructions of the Council; more than half of this has

been planted with trees and seeded, and the balance is ready for planting next Spring.

- (c) 90 acres have been levelled to create an airstrip; the balance of the disturbed acreage is either in the process of being mined or awaits grading prior to seeding.

During the past three years alone, some 18,000 trees have been planted in the course of restoration. The species used include:

- Caragana
- Russian Poplar
- Manitoba Maple
- Green Ash
- Colorado Spruce
- Manchurian Elm

The first two species have proven much the hardiest; the mortality rate on the other species has been excessively high.

The University of Alberta was consulted about a grass seed mixture and, on their advice, the following mix has been successfully used for the past 18 years:

- brome
- crested wheat grass
- alsike
- clover

Photographs of the restored area appear as Illustration B.

Approximately 98% of the land surface at Forestburg is owned by the company. The balance is accounted for by road allowances leased from the local municipality.

As an indication of the effectiveness of the reclamation work at the Forestburg mine, local farmers lease 676 acres of the seeded

area as pasture. Also, we are told that more game (birds and deer) is now to be found on the reclaimed land than was in the area prior to mining and reclamation.

VI SURFACE MINING IN THE MOUNTAIN REGION

The mining operation of Cardinal River Coals Ltd. at Luscar, Alberta (25 miles south of Hinton) provides an example of a surface mine in the mountain region of Alberta.

The history of this mining property warrants brief mention. Luscar developed the property in 1921 as an underground mine. Surface mining, using the small scale equipment then available, was added in the late 1940's to supplement underground production. In 1956, loss of markets forced the complete closure of the mine. Coal production to 1956 totalled approximately 15,000,000 tons, about 75% of which came from the underground workings. Following closure, the site was cleared at the company's expense; no derelict buildings were left to clutter up the landscape.

In 1968, Luscar and Consolidation Coal Company of Canada (the Canadian subsidiary of the second largest coal producer in the United States) formed a joint venture to reopen the mine as an open-pit operation. A contract for 1,000,000 long tons per year was negotiated with the Japanese. Many millions of dollars were invested in exploration and development, mining equipment, a complex coal preparation plant, other mine facilities, and railway equipment. The existing rail line into the property was upgraded at the expense (ultimately) of the company. Shipments of clean coking coal to Japan began in the Spring of 1970. Since then, the mine has succeeded in meeting its contract commitments with respect to both quantity and quality of coal.

To illustrate the nature of the mining operation, Illustration C is a cross section through a portion of the property showing two of the several pits which will temporarily be opened in the process of recovering coal, and then backfilled. Excavation of the first such pit will soon be completed. Overburden (consisting mainly of blasted sandstone, with a small proportion of shale) removed from what is shown as the second pit will be used to backfill the first pit, and this process will be repeated from pit to pit as mining progresses.

It is important to note that the nature of the surface mining operation at Cardinal River differs markedly from the so-called "mountain" or "contour" strip mining practiced in hilly areas of the eastern U.S. and illustrated by Illustration D. With that type of mining, problems have been encountered with spoil material pushed or dumped loosely over the sidehill; such material tends to slip, causing damage below, and this has given rise to a need for control and regulation. It should be apparent that regulations developed for such a situation are by no means applicable to the mountain conditions of Alberta and it would be a mistake to assume that they are applicable.

It is clear that there are two distinct aspects to the planning of mining operations in the mountain region of Alberta:

1. Planning physical operations to achieve suitable topography.

Note that most of the pits will be backfilled to approximately their original contour. This phase of mining plans is already completely controlled by the provincial government authorities.

2. Planning for Revegetation.

Information as to what is actually practical in the way of revegetation in the mountain region, at elevations of 5,000 to 7,000 feet, is still scanty. More research will be needed before anyone will be in a position to formulate practical revegetation regulations. In the meantime, Cardinal River is co-operating closely with the Forest Research Laboratory of the Canadian Forestry Service, which is carrying out studies on the mine property; initial findings of this research activity were contained in a preliminary report issued recently.

The first opportunity for large scale planting occurred this past Fall, when 50 acres were prepared, fertilized and planted with the following:

- fescue
- clover
- kentucky blue grass
- alfalfa
- flower seeds in meadow area
- tree seeds from Montana
- tree seeds picked locally.

The effect on water courses in the mining area is a major consideration in the planning process. We would like to recommend that more flexibility in the matter of diversion of minor water courses be permitted than has been allowed to date. At Cardinal River, the first pit intersects a minor creek. Permission was sought to divert the creek away from the pit, and let it flow into Luscar River rather than the Gregg River. Permission was denied, on the grounds that the authorities are opposed in principle to

any modification of water flow. As a consequence, the mine experienced serious operating problems last June, when approximately eight inches of rain fell during the month. The problem would have been manageable had we been allowed to divert the small creek. It can be expected that similar situations will be encountered in future.

A problem we are currently facing will illustrate the difficulties of both developing workable groundrules for surface mining operations in the mountains and endeavouring to maintain production before such groundrules have been formulated. In the course of opening the first pit at Cardinal River during the period from the Spring of 1969 to the Spring of 1971, part of the overburden removed was deposited on a planned overburden dump adjacent to the Gregg River. We now understand that the authorities are dissatisfied with the result, and indications are that the mine may be obliged to change the configuration of the dump. This will involve removing as much as 500,000 cubic yards of material, which will not only be very costly but will interrupt production operations and make it difficult to meet our delivery commitments. Before undertaking any such work, we will have to know what will be acceptable to the authorities; as yet, however, there are no definitive regulations specifying such matters as the maximum average slope of such overburden dumps, nor has it been decided whether a terraced profile will be acceptable (the company's mining engineers believe a terraced profile would in the long run prove more satisfactory than a continuous slope.)

VII EXPLORATION FOR COAL

Before a new mine can be brought into production, the mining company must undertake exploration work to determine:

- the existence of a coal deposit
- the quantity of coal
- the quality of coal
- the structure of the coal deposit
- the nature of the overburden
- mining conditions generally

In the foothills and mountains regions, this exploration process usually involves the following:

1. Initially, a reconnaissance on foot supplemented by aerial reconnaissance and interpretation of aerial photographs.
2. As the next step, we have lately been testing the use of portable electronic equipment (induced potential method) which involves no appreciable surface disturbance.
3. Sooner or later, we have to go onto the property with drilling equipment; we have both truck-mounted and crawler (Nodwell) mounted drilling equipment.
4. While relatively small samples can be obtained by core drilling, we normally need larger samples ('bulk samples') for purposes of designing the wash plant and for examination by prospective customers; such samples are obtained by opening small test pits on the property.

Normally in the foothills and mountain regions, such exploration activity is carried out on public lands. We doubt that it is generally realized how very tightly such exploration activities are already controlled by the government; for example:

- We must obtain advance approval before cutting lines, or undertaking geophysical exploration, drilling or test pit activities; this involves submitting plans and a description of the proposed work.
- We must obtain advance approval before entering onto existing cutlines with equipment.
- We are required to clear slash from cutlines (100% disposal 300 yards back from roads) and we are required to seed and fertilize the entire length of a new line.
- We are required to re-seed and fertilize existing cutlines traversed by our equipment.
- We pay a fee for using existing cutlines.
- We are required to pay for timber cut in the process of cutting lines.
- Any drill holes from which water flows must be reported and plugged.
- Upon completion of an exploration program, a complete report must be submitted to the Director of Minerals and the Director of Forests.

These regulations are closely enforced by the government departments involved.

It is difficult to imagine how the exploration activities of the industry could be more closely regulated, or where it might be contended that there is any need for tighter control or enforcement.

We believe that the present requirement regarding how quickly test pits must be backfilled is unrealistic and works a pointless inconvenience on the industry. Normally there is a legitimate need to obtain samples, for customers and for plant-design purposes, from a test pit over a period of up to two or even three years. However, at present we are under pressure to backfill test pits quickly after opening them up. We submit that such premature closure is unnecessary and unrealistic, and we would like to suggest that more latitude be permitted in this matter.

ILLUSTRATION A

SURFACE MINING IN THE PLAINS REGION
FORESTBURG COLLIERIES LIMITED
NEAR FORESTBURG, ALBERTA

RECLAMATION VEGETATION

TREE AND SHRUBS PLANTED EVERY 100 FEET

1. DOUBLE ROWS - CARAGANA
2. RUSSIAN POPLAR - 35' CENTERS

GRASS MIXTURE - RECOMMENDED BY THE
UNIVERSITY OF ALBERTA

- 5 LBS. BROME
- 4 LBS. CRESTED WHEAT GRASS
- 2 LBS. ALSIKE
- 4 LBS. CLOVER
- 15 LBS. PER ACRE TOTAL

PLAINS REGION

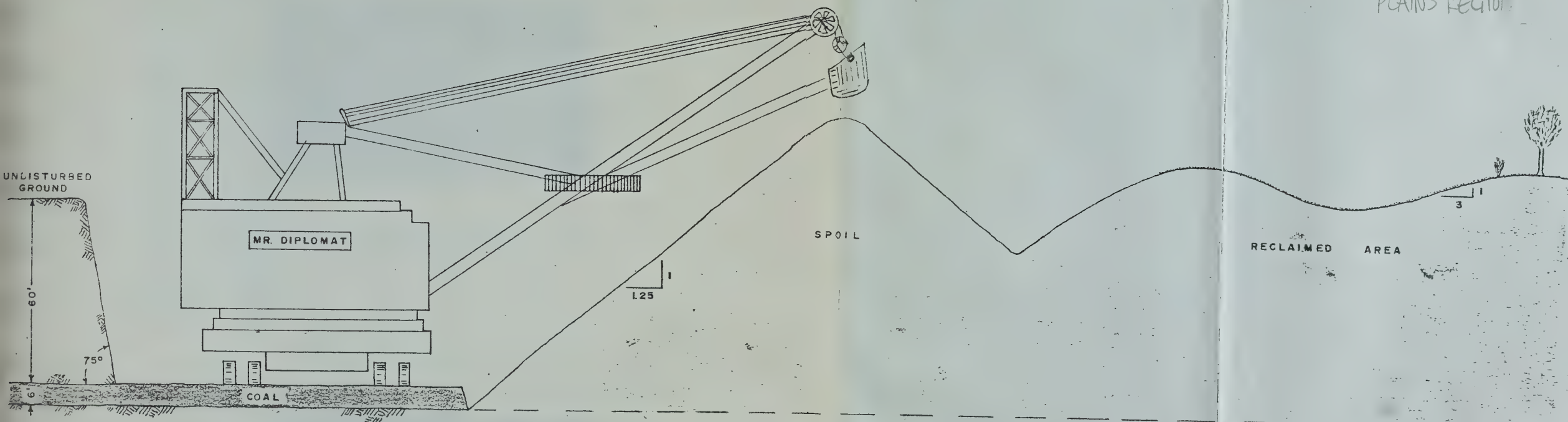


ILLUSTRATION B

PHOTOGRAPHS OF LAND RECLAIMED BY FORESTBURG COLLIERIES LIMITED



PHOTOGRAPHED AUGUST 1970 ; AREA TO LEFT
OF FENCE WAS SEEDED IN SPRING OF 1970



PHOTOGRAPHED IN AUGUST 1970
FOREGROUND: RECLAIMED AND SEEDED PRIOR
TO 1966
BACKGROUND: RECLAIMED AND SEEDED IN 1969

ILLUSTRATION C

SURFACE MINING IN THE MOUNTAIN REGION CARDINAL RIVER COALS LTD. AT LUSCAR, ALBERTA

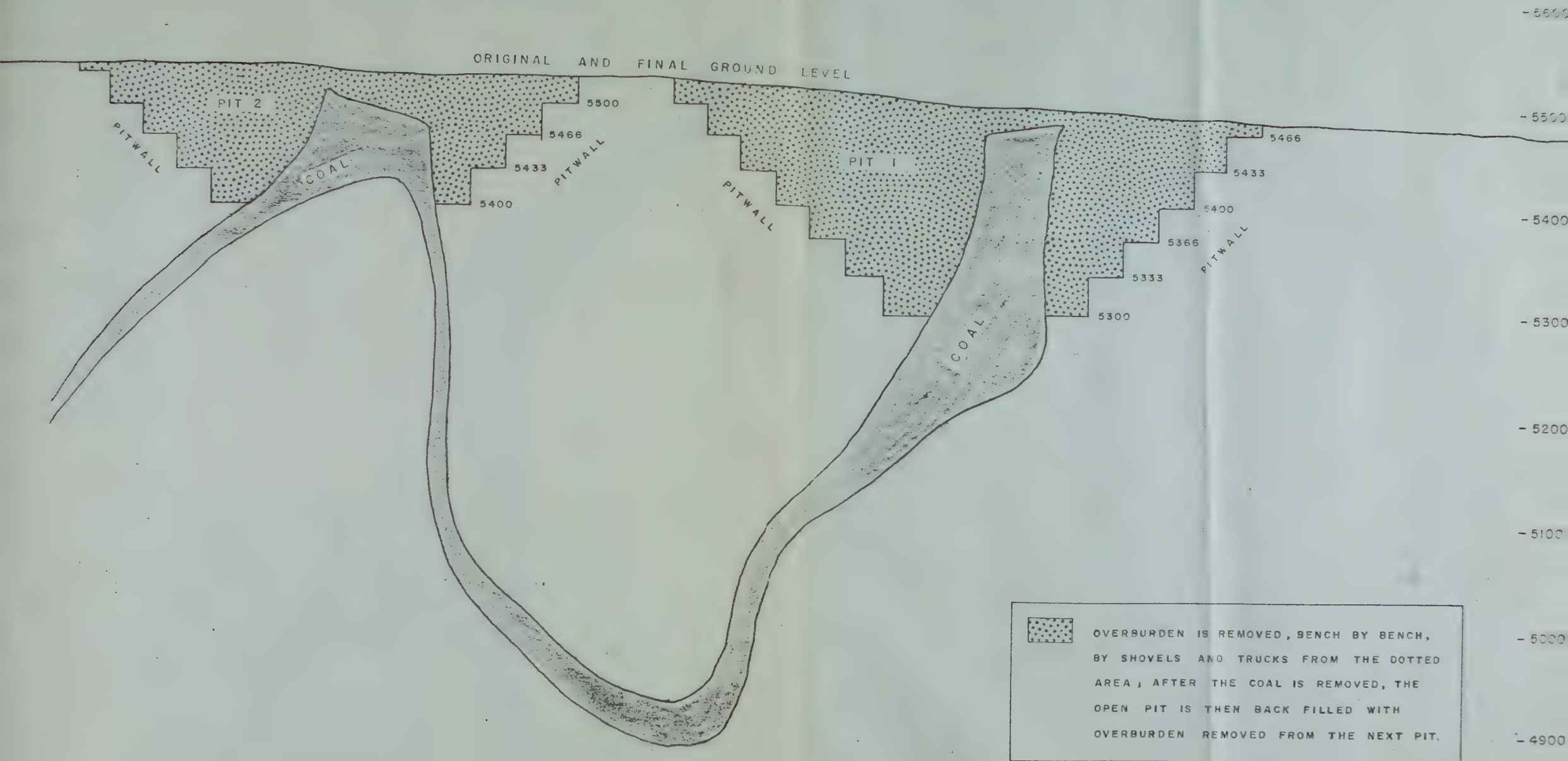
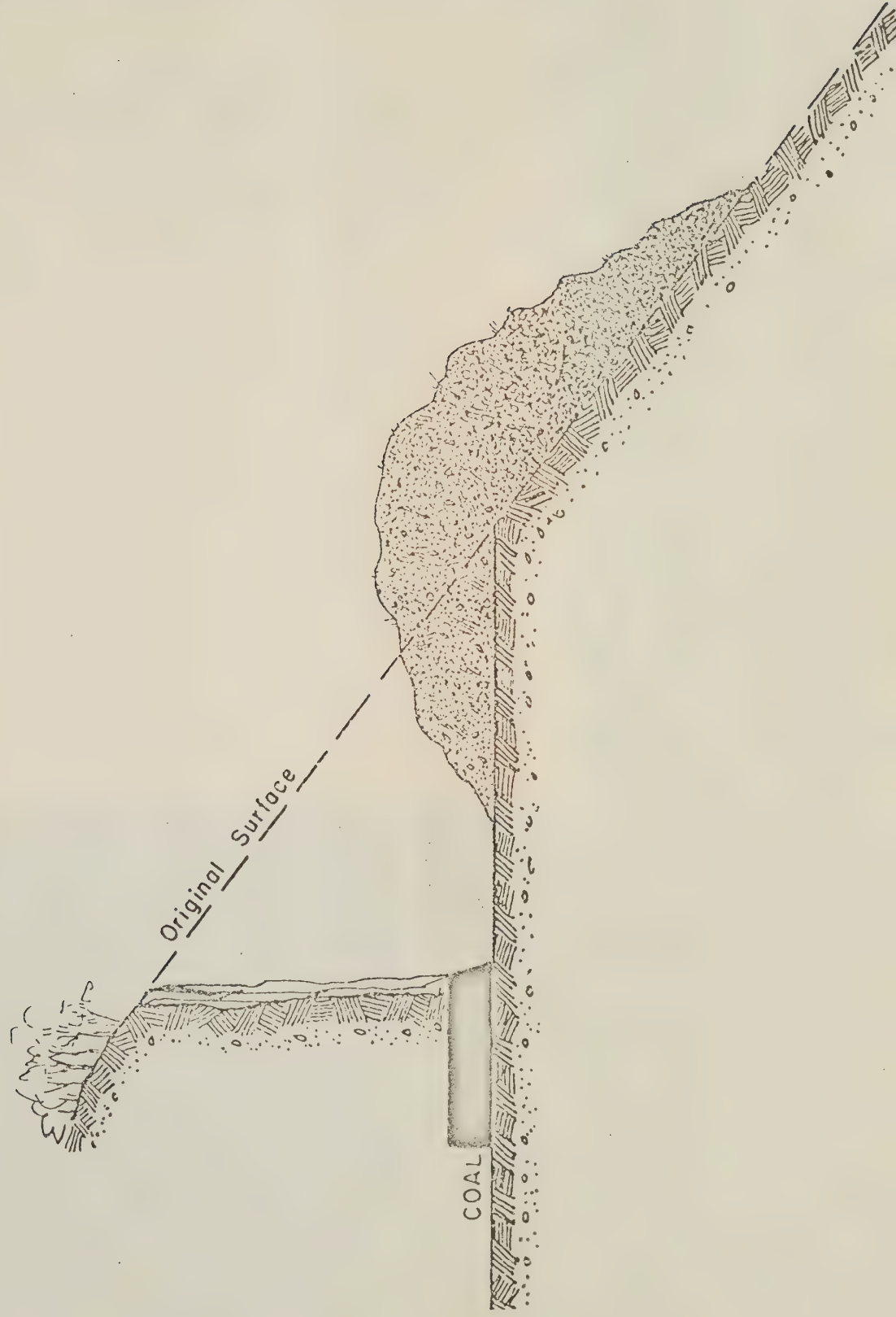


ILLUSTRATION D

"MOUNTAIN" OR "CONTOUR" SURFACE MINING
IN THE EASTERN UNITED STATES



HC
68
L968

12072
The Environmental Impact of
Surface Mining in Alberta

5

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